Diabetes in the School

Treatment of Emergencies. . . .

M A Murray, 2006

Type 1 Diabetes

- Type 1 diabetes is one of the most common chronic disease of childhood
- Good control of diabetes will decrease the risk of long term complications and improve school performance
- Good control must be balanced with:
  - Risk of hypoglycemia
  - Participation in all childhood activities

Pathophysiology

- Etiology remains elusive
  - 2 hit phenomenon:
    - Genetic predisposition
    - Triggering event: Viral infection? Antigenic stimulus?
- Not preventable, not predictable
- Incidence is increasing worldwide
- Permanent, no cure available

Epidemiology

- INCIDENCE: 15/100,000 American children per year
  - Utah: at least 150 children per year
  - PCMC: over 200 children newly diagnosed type 1 diabetes per year
    - Underestimating our statewide numbers?
- PREVALENCE: 1/300-400 by the age of 15 yrs.
  - Peak occurrence at ages 5-7 and at puberty
  - Incidence is increasing with the most marked increment in the < 5 yo ages
  - Utah school population is 500,000

Type 1 Diabetes: Treatment

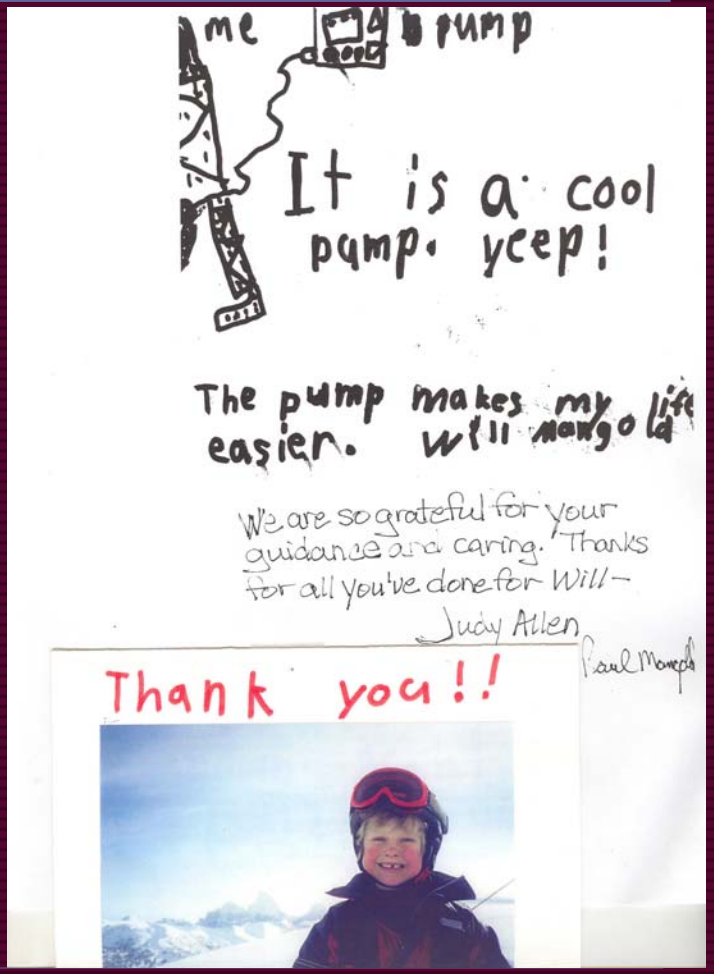
- Replacement of insulin
  - Must be administered by injection
  - Must be coordinated with food intake
- There is little usual routine anymore
  - Used to be 3 injections/day
  - Now at minimum of 3 injections and may be as many as 7
  - Goal is to individualize therapy so as to minimize the intrusion into life

Why worry about the numbers?

- History of diabetes
  - Decreased life expectancy
  - Diabetes has been leading cause of blindness and renal failure in the US
- DCCT:
  - Improved control decreases frequency of complications

Goals of Pediatric Care

- Enable children/teens to participate in all age appropriate activities with their peers
- Maximize diabetes control within the constraints of school environment
  - Prevent long term complications
  - Minimize the risk of hypoglycemia
- Minimize the intrusion on school whenever possible without sacrificing control



Insulin Administration

- Insulin must be coordinated with food
- Dose will vary with blood glucose level, food intake, and exercise
- Traditionally, use of NPH eliminated routine administration of lunchtime shot
  - More frequent use of pumps and lantus insulin means more children need a lunch shot of insulin
  - Lunch shots require calculation of insulin dose
    - Cover carbohydrate intake and correct for “out of range” blood glucose

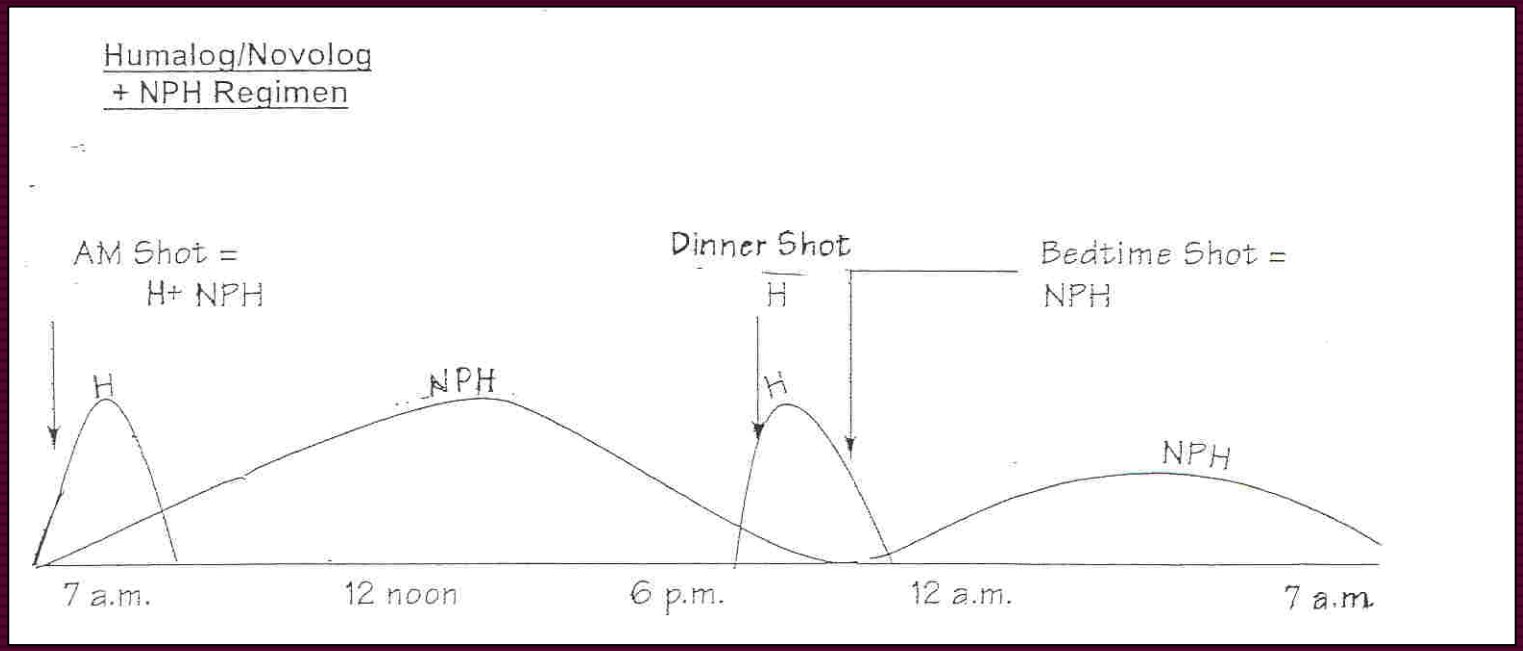
Types of Insulin

- Long acting:
  - Glargine
- Intermediate acting:
  - NPH
- Short acting:
  - Humalog™, Novalog™
- Premixed:
  - 70/30, 75/25

Insulin Dosing with NPH

- Mixed dose of short and intermediate acting before breakfast, short acting before supper and long acting at bedtime
- Requires lunch be consistent with respect to time and amount of carbohydrate
  - Lunch injections prn hyperglycemia
  - Staggered lunch times are a challenge as late lunch may result in hypoglycemia
  - May require a morning and/or afternoon snack

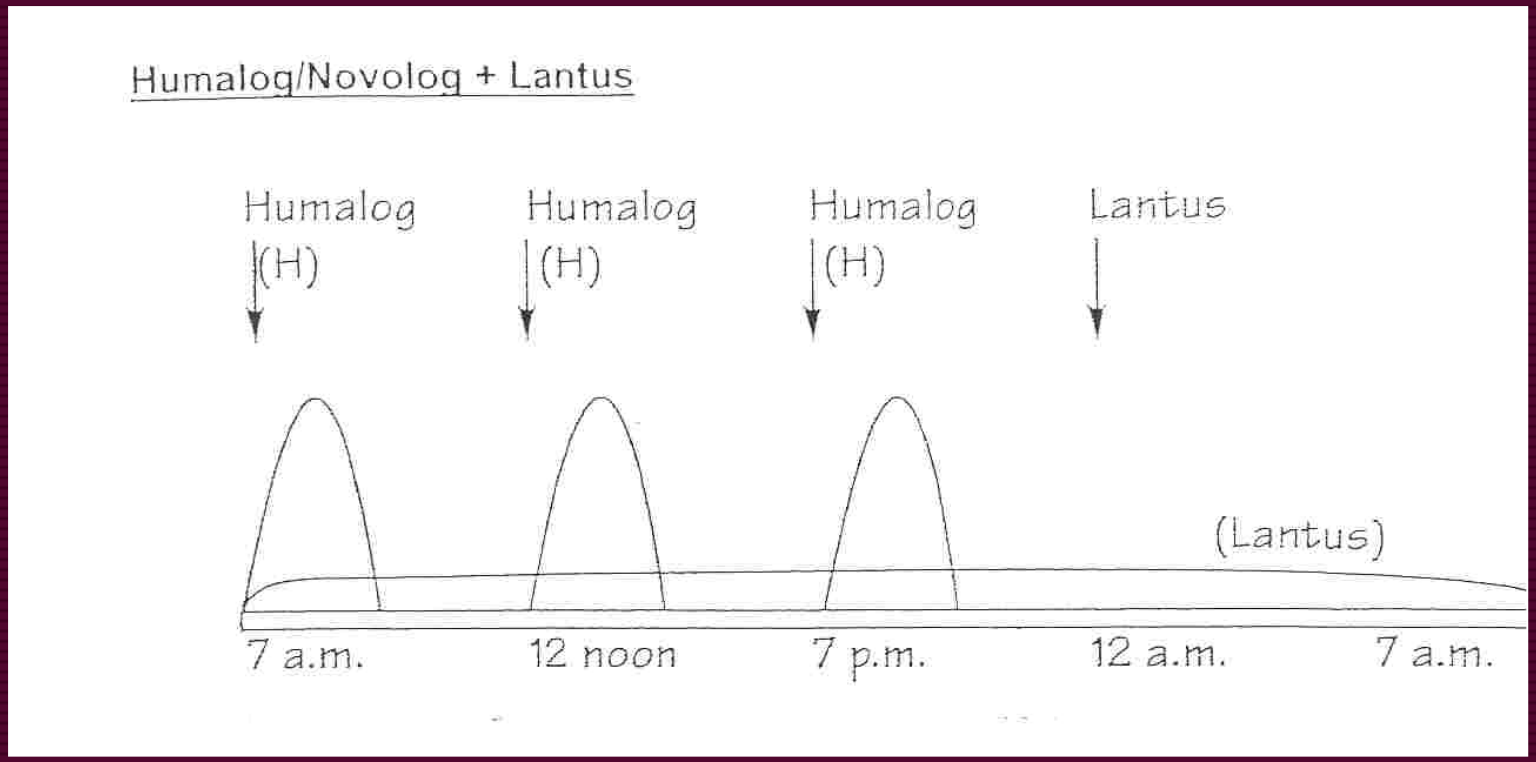
NPH Dosing


Humalog/Novolog
+ NPH Regimen
AM Shot =
H+ NPH
Dinner Shot
H
Bedtime Shot =
NPH
H
NPH
H
NPH
7 a.m.
12 noon
6 p.m.
12 a.m.
7 a.m.

Insulin Dosing: Lantus

- Lantus provides 20-24 hour background or basal coverage
- Short acting insulin given at times of food intake
  - Meals and snacks require an injection of insulin
  - Dose for carb intake and correction of “out of range” glucose
- Increased injections provide increased flexibility
  - Time and quantity of food are flexible

Lantus Dosing



Insulin Dosing: Pump

- Pattern of insulin resembles Lantus profile
  - More flexibility
  - Micro-dosing
- CSII or insulin pump
  - Continuous sc infusion of short acting insulin
  - Requires calculation of both a carb dose for food and correction dose (pump does much of the math)
  - In event of pump malfunction, have only about 4-6 hours of insulin coverage

Blood Glucose

- Target range varies with age:
  - 100-200 mg/dl if age < 7
  - 80-180 mg/dl in 7-12 yo
  - 70-180 age > 12 years
  - Modify based upon child's maturity and ability to recognize hypoglycemia (low blood sugar)
- Even in the best of all worlds, no one can achieve target range 100% of the time

Getting Control

- Blood sugar checks 4-6 times/day
  - Before meals, before bedtime and prn
- Written records and regular review of numbers
- Control is not achieved instantaneously nor 100% of the time so there will be abnormalities in school

Limitations to Control

- Avoid hypoglycemia
  - Deteriorating school performance
  - Hypoglycemia unawareness
  - Vary blood glucose arget ranges for age and circumstances
- Independence
  - Insulin pens
  - Responsibility: will the child do lunch glucose and dose insulin independently? Attend to pump alarms?
- Communication
  - Important to relay blood glucoses home; dosages are adjusted upon patterns not single values
  - Important to relay schedule changes to family for dose adjustment

Hyperglycemia

- Does not require leaving school
  - Allow free access to water and bathroom
  - Notify parent if vomiting or ill
- Notify parent of blood glucose
- Etiology
  - Stress
  - Extra food
  - Intercurrent illness

Hypoglycemia: Blood sugar 50-70

- Important not to overtreat:
  - 15-15 rule, follow with snack if not eating within 30 min.
- No one can prevent all lows.
  - Recurrent episodes may be preventable
  - Recurrent mild episodes may be evident as poor school performance
- Never send child out of classroom alone

Hypoglycemia: Blood sugar < 50

- Alert, able to cooperate and take po
  - 15-15 rule: 15 gms carbohydrate and recheck BS in 15 min.
  - Give a snack if not eating within 30 min.
  - Check on child later
  - Notify parent
- Unconscious / Severely Impaired
  - Glucagon and call 911

Why Give Glucagon?

- Deficiency of glucose to the brain can result in severe brain damage or death if not treated quickly
  - Quickly treated, severe hypoglycemia has no long term consequences
- Glucagon is the fastest means of treating hypoglycemia
  - Safe with virtually no side effects

What is Glucagon?

- Pancreatic peptide hormone
- “Anti-insulin” in that it acts to raise the blood glucose level
  - Release of glucose from the liver
  - Onset of action is rapid-few minutes
  - Duration of action is short – 15-20 minutes
  - Effects are the same in diabetic and non-diabetic individuals
- Side effects are minor
  - Nausea and vomiting

When Should Glucagon be Given?

- Glucagon should be given when the hypoglycemia is severe enough that the individual cannot swallow safely
  - Ideally, a blood glucose is done to confirm hypoglycemia, but it is not necessary
  - Individuals with signs of severe hypoglycemic including being combative, disoriented and confused, loss of consciousness, convulsions

What does Glucagon Look Like?

Glucagon Treatment

- Have someone call 911
- Inject diluent into powder and mix
- Withdraw 0.5-1.0 ml

Glucagon Treatment

- Give in the arm or thigh, can be given IM or SC
- Turn child on his/her side
- When more alert, give oral carbohydrates
- Notify parent

National Recommendations for Use of Glucagon

"If students become unconscious or experience convulsions or seizures, position them on their side to prevent choking. Immediately contact the school nurse or trained diabetes personnel, who will administer an injection of glucagons, **if indicated** in the student's Diabetes Medical Management Plan. While the glucagon is being administered, another school staff member should call for emergency medical assistance and then notify the parents/guardian. If glucagon is not authorized, staff should call 911 immediately.

The student's parents/guardian should supply the school with a glucagon emergency kit. The school nurse and trained diabetes personnel must have ready access to the glucagon emergency kit at all times."

National Diabetes Education Program. "Helping the Student with Diabetes Succeed: A Guide for School Personnel." U.S. Department of Health and Human Services, June 2003.

National Recommendations for Use of Glucagon

"Supplies to treat hypoglycemia, including a source of glucose and a glucagon emergency kit, **if indicated** in the Diabetes Health Care Plan. An adult and back-up adult(s) trained to administer glucagon, **in accordance** with the student's Diabetes Medical Management Plan. An adequate number of school personnel should be trained in the necessary diabetes procedures (e.g., blood glucose monitoring, insulin and glucagon administration) and in the appropriate response to high and low blood glucose levels to ensure that at least one adult is present to perform these procedures in a timely manner while the student is at school . . . ."

American Diabetes Association. "Diabetes Care in the School and Day Care Setting." *Diabetes Care,* 28 (Suppl. 1) January 2005.

Senate Bill 8

- Provides for school personnel (volunteers) to be trained to administer glucagon
- Grants liability immunity to individuals who act in good faith and to health care professionals who train individuals
- Modifies current law to allow children/teens with diabetes to carry their prescription and non-prescription medication, devices, and supplies with them with a signed authorization from a parent and licensed health care provider

Why is this Important?

- Glucose control is tighter than it has ever been and despite best efforts, hypoglycemia will occur
- Diabetes does not disappear during the school day
  - Children may spent significant hours a day at school, but diabetes is a 24 hour a day issue
  - Children are in an unsafe environment if hypoglycemia cannot be treated according to best practices
  - Children are prevented from participating fully in activities if they are not safe
- Glucagon is the fastest means to raise the blood glucose
  - Glucagon is safe and can even be given to a non-diabetic with no significant risk
- We do not have full time nurses in all our schools
  - Glucagon is designed to be administered by a non-medical individual
  - Fear about liability may prevent administration of glucagon by school personnel

Support

- Bipartison support in the legislature
  - Sponsors: Senator Patrice Arent, Representative Margaret Dayton,
  - Co-Sponsors: Senators Ed Mayne, Howard Stephenson, Chris Buttars, Karen Hale, Mark Madsen, Gene Davis, David Thomas, Scott McCoy, and Fred Fife
  - Unanimously passed Interim Senate Education Committee, Unanimously passed Senate Education Committee
- ADA, JDRF, Utah Diabetes Center, Utah PTA, Diabetes Educators of Utah, Utah School Nurse Association, Intermountain Pediatric Society, Primary Children's Medical Center, Dr. David Sundwall Executive Director of the Utah Department of Health, Gayle Ruzicka, Utah Education Association, State Board of Education, Utah School Boards Association, Utah School Superintendents Association

If you want to weigh in:

- Contact local chapter of the ADA
- Contact legislator (has not been presented to the house delegates)

- Resources:
  - ADA website
  - CDC website
  - Dawn Higley, RN CDE: trained in 504 applications re: diabetes

Questions??????

Summary

- With the exception of severe low blood sugar, children should not be sent home because of their diabetes
- Good control requires school, family, and MD participation
- If you have questions re: student's care, we will be happy to discuss problems / concerns (with parental permission)

Summary

- Control of the diabetes is individual
  - As much as you or I might want intensive management, not all children/families are able to do it
- Compromise is needed to achieve the best control possible for any one child

Questions??????